

Science and Technology, Saviour or Destroyer?¹

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Introduction.

Technology conjures up a slightly soiled image these days. It reminds us of industrialised cities, of pollution, of the uranium debate, of bauxite mining and wood chipping. It may trigger-off images of psychological manipulation, of drugs, and of impending fuel shortages. Many people would agree with Georges Pompidou, former French President, when he said with typical French candour: "There are three roads to ruin: women, gambling and technicians. The most pleasant is with women, the quickest is with gambling, but the surest is with technicians."

To some people science applied to technology is below par for the course and is pursued by people who are not quite able enough to make a career in pure science, though in this connection I am reminded of a statement made by Sir William Hardy to Sir Henry Tizard when he said: "You know this applied science is just as interesting as pure science, and what's more it's a damned sight more difficult."

Despite all this I am glad to be an applied scientist. I started science by accident, in the sense that at the end of 1st Year at Perth Modern School, I dropped French and took up Chemistry. My main reason for making this decision was not because I carried out chemistry experiments at home or was interested in any way in the subject, but rather that the French teacher continually made jokes about my pronunciation of the language. However, once the decision was made I was irrevocably destined for a career in science. And as I recall it, my father (who was of French extraction and held a Master of Arts degree) encouraged me to do science because he believed that the future lay with science and not the Arts.

To my great surprise I enjoyed my chemistry lessons enormously. Our teacher was the school's Art teacher who was fascinated by colours. Much of our course was taken up in manufacturing chemicals which possessed the most beautiful colours. But I do not consider

that year was wasted. We may not have learnt a lot of chemistry, but we did learn that science is concerned with beauty and is intimately related to the real world. Perhaps because of this background I have never agreed with C. P. Snow's Two Culture thesis, for my experience indicates: that scientists have a sense of wonder at the majesty of nature; that they are people with a sense of history and an affinity for the past; that a significant number have a deep love of music and art, and that they possess an innate curiosity and concern for the world in which they live—and that science is *not* just a storehouse of facts to be used for material purposes, but is one of the great human endeavours which ranks with religion and arts as one of man's quests for truth.

Unfortunately the world has lost the capacity to wonder. We have lost the childhood-like innocence of an Isaac Newton, who described himself as a boy playing by the sea shore and being fortunate enough to find prettier shells than the ordinary, whilst the great ocean of truth lay undiscovered before him. Well, I guess we have now discovered many of the pebbles and sea shells. We have seen the "Whizz Bang" discoveries of the scientists, we have watched the astronauts on the moon and learnt to accept the modern computer as a part of our everyday life. In a sense, like Robert Oppenheimer's nuclear physicists, we all *know* science and technology, and have, to a certain extent, lost our experience to wonder.

The modern day disenchantment of Science and Technology is part of a disenchantment with ourselves, with our achievements and our failures. We have failed as people, as communities and as nations. We have climbed our mountains and found that the achievement is less satisfying than the achieving. In our disenchantment we have attacked the prophets who promised us salvation, and certainly, Science and Technology are there to take a share of the blame.

But it is misleading to point the finger at Science and Technology—the tool. We should look for a moment at the users of the tool and not delude ourselves into believing that by destroying the tools, we have in some miraculous way changed the users.

¹ Read at an evening meeting held at the University of Western Australia on 24 April 1978 as part of a symposium entitled "What is Science?" organised by the Royal Society and the University of Western Australia Extension Service.

The Saviour of Mankind?

In 1930 Richard Gregory, who at that time was Editor of *Nature* made the following statement: "My grandfather preached the Gospel of Jesus Christ. My father preached the Gospel of Socialism. I preach the Gospel of Science."

Well, not many people believe in Saviours anymore! M. Lefeaux on one occasion confided to Talleyrand his disappointment at the ill success with which he had met in his attempt to bring into vogue a new religion which he regarded as an improvement on Christianity. He explained that despite all the efforts by himself and his supporters, his propaganda made no headway. He asked Talleyrand's advice as to what he should do. Talleyrand, the Statesman Bishop who became a leader of the French Revolution and later Prime Minister of France, replied that it was indeed difficult to found a new religion, so difficult that he hardly knew what to advise. "Still", he said after a moment's reflection "there is one plan which you might at least try. I suggest that you be crucified, and rise again on the third day." The record does not indicate if Lefeaux accepted Talleyrand's advice, but I suspect that he declined.

The emergence of modern society, beginning in the 16th Century, marked the beginning of a period of great optimism about science. The new science, based on observation and experiment, was to be a liberating force for humanity. Francis Bacon, in many ways the midwife of the scientific revolution in the United Kingdom, said: "the truth and lawful goal of the sciences is none other than this, that human life be endowed with new discoveries and powers."

In his Utopian work "New Atlantis", Bacon described a society in which science was dedicated to increasing the welfare and benefits to humanity. Science was to multiply human enjoyments and mitigate human sufferings. By controlling nature it was hoped that science could bring relief from hunger, disease and drudgery in an age which has been described by Hobbes as "nasty, brutish and short."

Since those days science has become a dominant force in our society. Advances in medicine *have* reduced disease and increased our life expectancy. The green revolution *has* provided new hope in the battle against hunger. Transport and communication developments have brought the peoples of the world closer together. The Apollo flights have revealed the fragility of our "spaceship Earth", and astronomical discoveries have given man a new perspective on his place in the Universe.

The tremendous impact of science on civilization springs for the most part from the numberless practical applications of scientific knowledge. Technology, or the art of contriving things and situations to man's advantage, is as ancient as conscious man himself. It has thrived in various forms and to various degrees in all civilizations. Pre-scientific technology,

however, resulted by and large from trial and error gropings and human ingenuity. It was not based on much understanding of the principles on which the contrivance worked.

To most people the link between the abstrusities of science and the wonder of modern life is technology—seen as tangible machines that produce goods or ease the burden of labour. Thus the goals of technology are simple; to reduce muscular effort in the fulfilment of man's daily needs; to increase man's comforts and conveniences; and to render him collectively, as a nation, powerful enough to defeat his enemies in time of war.

There would be no disagreement with the thesis that our lives are affected by Science and Technology in thousands of different ways, and that the achievements of these are all around us. But have the hopes of the new science been realised? Have we witnessed the relief of man's estate?—to use Francis Bacon's turn of phrase. Are the goals of technology worthwhile to mankind in the long term? Are Science and Technology indeed our Saviours?

To these questions a growing number of people, both scientists and non-scientists, are beginning to give ambivalent answers.

We live in a world faced with the possibility of destruction by a nuclear holocaust, a world confronted by environmental despoliation, of test-tube babies and genetic engineering, a world in which more than half the population faces some form of malnutrition and two-thirds live in poverty. Faced with such a world, many people are beginning to reassess the role of science and technology, and even the Organization for Economic Co-operation and Development (OECD) acknowledges 'a growing public disenchantment with science and technology.'

The Destroyer?

Well, if Science and Technology are not the Saviours of Mankind, are they, as the subtitle suggests, the Destroyers?

"Technology—Opium of the Intellectuals", was the title of a famous article in the *New York Review of Books* several years ago. In it the author argued that we in the industrialised nations had become enslaved and addicted to technology, which by providing material comforts, covered up the deeper and more important social, psychological and political shortcomings of present forms of society.

This view of technology, while by no means a majority one, has recently grown in importance, particularly in the industrialised world and especially among the young. It has led to a view that it might be a good idea to do away with technology altogether, and return to forms of society in which human and social issues once again become the main concerns.

Professor von Euler, who was awarded the Nobel Prize for his outstanding work on the role of adrenalin in stress reactions, tells a charming true-life story which illustrates how

very simple people can have the wisdom to realise that the love of your neighbours is much more likely to bring happiness, than the material gains offered by a technological society. "In a train over the Andes, between Mendoza and Santiago I sat talking to a Bolivian farmer, and asked him whether he utilised modern fertilisers to increase his harvests. 'Oh, no', he said 'that would only create dissatisfaction in my neighbours. I prefer a modest harvest so that I can remain on good terms with them.'" We can respect this farmer's wisdom, because so few of us would be able to imitate him. And perhaps if we were honest with ourselves, most of us would have to admit that we like to exhibit our superiority both as individuals and as members of a "developed" nation.

For it seems to be a fact of life that people who are forced to live without technology quickly become unhappy with their situation when they see others benefiting from it. It is the "developing" countries (that euphemistic phrase beloved by politicians) which love the trappings of technology and exhibit their beautiful nuclear reactors supplied by the "developed" countries as exhibits of their own evolving technology.

The case against Science and Technology

The current criticism of science and technology is taking place at two levels—the material level and the philosophical level.

The attack at the material level is too well known to need elaboration. In his opening address to the Ciba Foundation's symposium on civilization and science, Hubert Bloch summarized the thesis of this attack as follows: "It lies in the contribution of science to the deterioration of our world—or rather in the uncontrolled application of scientific technology that leads to the now well-known problems of environmental pollution, the use of science for war and destruction and the social implications of the by-products and side effects of medical progress—and in the fact that science and technology have failed in many people's view to make our lives happier and more meaningful." The critique at this level thus concentrates discussion on the familiar catalogue of the ways in which science and technology have contributed to the deterioration of the human milieu.

The second kind of criticism is of a more sophisticated nature and is far more "anti-scientific" than the material level of criticism. The criticism is not so much directed at the role of science in contemporary society but at the oppressive nature of the scientific method itself. It is argued that science dominates modern culture to such an extent that we have come to accept that the only experiences which are real are those that can be confirmed scientifically and be given an independent, objective existence. Thus our senses, it is argued, are no longer allowed to provide us with an experiential approach to life.

Can all human emotion and experience be reduced ultimately to a page of mathematical symbols?—it is asked. Can thought really be explained in terms of physical and chemical reactions? Can we discover the possibilities of ourselves and our world solely through the exploration of this form of consciousness? Those who would answer "no" to these questions believe that our all-encompassing faith in the scientific mode of consciousness has become oppressive, because it shuts us off from the real world of experience.

The historian Theodore Roszak in his book "Where the Wasteland Ends" makes a typical assault on the myth of scientific objectivity. The problem which Roszak has raised is that of the relationship between the objective world "out there" and the subjective world "in here", between rationality and romanticism, between intellect and emotion. Roszak's writings represent the hippy, flower-power subculture. He claims that the scientific mentality is intrinsically alienating.

Scholars such as Everett Mendelsohn, Lewis Mumford and Herbert Marcuse claim that modern science, rather than being a Saviour, is a false God that must itself be destroyed lest the scientific method inevitably lead to a dehumanised society, and possibly even to total destruction.

Outlook for the future

Professor F. R. Jevons, Vice-Chancellor of Deakin University and formerly Professor of Liberal Studies in Science at Manchester, gave a lecture at W.A.I.T. last year in the "Science, Technology and Public Policy" Lecture Series. He pointed out that in times when public opinion has swung away from science it is all the more important to use science and technology to best advantage. He pointed out that if one speaks about alternative systems we are really talking about alternatives *within* the science knowledge system, not alternatives to it. Those who argue for a return to Nature, are not *really* talking about a return to a mode of living which involves cholera, typhoid and leprosy; they are talking about a controlled Nature, in which science must still play a role.

A concern with the environment, with the quality of life, means an increasing need for applied science and technology, and in the long run, for more pure science as well. We want to create, for example, incentives for the development of more modest technologies less intrusive as far as the environment and the human individual is concerned. Technologies like this could be doing some of the necessary industrial tasks that are performed today by technologies that are too much of a nuisance. We want to create incentives for the development of counter-technologies in order to repair, where it is reversible, the damage that technology has done.

We want to create attractive employment for people whose work has to be curtailed or abandoned because it is too destructive or too unpleasant for the rest of us. In short, we need a great deal of science and technology in order to provide a much longer menu of possibilities from which society can select the few tasty and nutritious dishes that are indicated by the technology assessment process. We want to feel free to do research on and sometimes to develop or even to bring into the prototype or initial production phase, technologies that we can then renounce as inappropriate on total human appraisal.

What is required is the joint effort of people from many disciplines. Not only the science disciplines but also the social sciences and those who understand the social process. We need to learn much more about the nature of science and technology, of the relationships between them and their impact on social evolution. Human societies are more complex than we once imagined and every intervention has unforeseen results.

More power has not made us wiser or more considerate. Only a better understanding of society coupled with a new appreciation of the role of science and technology can determine our future.

Society has demanded better transport, better communications, better drugs and medicines—and science and technology has supplied them. Yet it is only in recent years that we have realised that man is not satisfied by bread alone, that an abundance of material things do not satisfy the human soul. Life requires a sense of purpose if it is to have meaning, and perhaps the aims of technology as perceived by society and listed earlier in this lecture, need re-examination. I think society is in much the same situation as was Cardinal Wolsey in Shakespeare's 'King Henry VIII', when he said: "If I had served my God with half the zeal I served my King, he would not in my age have left me naked to my enemies." And perhaps if we had spent half as much time and effort in seeking to make men brothers as we have in producing material things, then we may not have found ourselves in our present situation.

Robert Pirzig's novel "Zen and the Art of Motorcycle Maintenance" is devoted to prob-

lems of the split in our culture, and in our ideas of intellectual and emotional reality. Pirzig argues that: "A motor cycle functions entirely in accordance with the laws of reason, and a study of the art of motorcycle maintenance is really a miniature study of the art of rationality itself." He also believes that: "The Buddha, the Godhead, resides just as comfortably in the circuits of a digital computer or the gears of a cycle transmission as he does at the top of a mountain or in the petals of a flower." Pirzig believes that the way to solve the conflict between human values and technological needs is not to run away from technology, but to break down the barriers of dualist thought that prevent a real understanding of the nature of technology. Technology is not an exploitation of nature, but a fusion of nature and the human spirit into a new kind of creation that transcends both.

The intellectual leadership of the 20th Century rests with scientists, and as Jacob Bronowski has pointed out, that poses a grave problem because science is a source of power that walks close to Government and that the State wants to harness. This is of concern because the very rigour of their training sometimes allows scientists to be manipulated by men wise in political ways. But if science allows itself to be used in this way, the beliefs of the 20th Century will fall to pieces in cynicism.

For some time we, as citizens of a technological society, have been living in a crisis of human values. Traditionally we have looked to religion for our moral and ethical guidelines, but our confidence in theology has been eroded. Science and technology have pervaded our lives and cultures to such an extent that we have been tempted to look to science itself for values. But science cannot be the sole provider of these values—in fact it is a factor in the present crisis.

It is not the business of science and technology to inherit the earth. Rather it may be that science working together with religion and philosophy, might be able to create a set of human values which will allow us to emerge from our chaotic time of transition. So perhaps Science and Technology may yet be the Saviour rather than the Destroyer of Mankind, though in a different way than we first imagined. Time alone will tell.